United States General Accounting Office

GAO

Testimony

Before the Subcommittee on Strategic Forces,
Committee on Armed Services,
United States Senate

For Release on Delivery
Expected at
9:30 a.m. EST
Wednesday,
March 13, 1996

NUCLEAR WEAPONS

Status of DOE's Nuclear Stockpile Surveillance Program

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GAO/T-RCED-96-100

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to discuss the preliminary findings from our ongoing review of the Department of Energy's (DOE) nuclear weapons stockpile surveillance program.[1] The program uses various tests to identify problems in our nuclear weapons stockpile. Over the years of conducting these tests, DOE and its predecessor agencies have found and corrected many defects and failures in nuclear weapons systems and components. Because our nation's nuclear weapons stockpile is aging and new nuclear weapons are not replacing older ones, this program has become increasingly important to ensuring the reliability of the stockpile.[2]

Our preliminary analysis of data indicates that DOE has not conducted all the tests it believes are necessary to ensure the reliability of the nuclear weapons in the stockpile. For some types of weapons, the tests are far behind schedule and DOE's confidence in the reliability of those weapons is diminished. DOE has not conducted the scheduled tests for various reasons, including equipment problems, lack of space on missiles for testing, the absence of a required safety study, and delays in testing while testing operations were being transferred to new locations. Although DOE plans to get some tests back on schedule within a few years, it appears that other tests will not be back on schedule for the foreseeable future. I would like to stress at this point that the data is preliminary and we have not yet fully analyzed the impact of this situation.

DOE Tests Nuclear Weapons to Ensure Reliability

The purpose of DOE's surveillance program is to ensure, through various tests, that the reliability of nuclear weapons is maintained. The testing program is designed to allow DOE to predict the reliability of the entire stockpile by weapon type. The program consists primarily of three types of tests—nonnuclear flight tests, nonnuclear systems laboratory tests, and laboratory tests of the nuclear components. Flight tests involve the actual dropping or launching of a weapon from which the nuclear components have been removed. Nonnuclear systems laboratory tests involve testing the nonnuclear systems in the weapon to detect defects due to aging, manufacturing, or design. Laboratory tests of the nuclear components involve destructive analysis to detect defects or failures in the nuclear portion of the weapon.

[1]This review is being conducted for the Senate Committee on Armed Services in response to its February 1, 1996, request.

[2]DOE's stockpile surveillance program also tries to identify safety problems in nuclear weapons. The primary focus of this testimony, however, is DOE's ability to ensure the weapons' reliability.

Weapons for flight and nonnuclear systems laboratory tests are randomly selected from the stockpile each year. Laboratory tests of the nuclear components are judgmentally selected from the weapons that have been randomly selected for the other two tests. For testing purposes, DOE considers the active stockpile to consist of nine weapon types.

From 1958 to 1996, the surveillance program tested about 14,000 weapons, systems, and components with more than 2,400 findings documented. Over 50 percent of these findings were considered "significant findings." A significant finding is the identification of a defect or failure in a weapon system. A defect is an observable anomaly, while a failure is a flaw or malfunction in a weapon that would prevent it from operating as intended. About 1.3 percent of the tests have identified failures.

When a test results in a significant finding, DOE may perform additional tests to confirm the finding, determine the cause of the problem, assess its impact on the stockpile, and recommend a corrective plan if retrofits or repairs are needed. According to a DOE official, when a significant number of tests are cancelled or delayed, DOE lacks information on the reliability of the weapon. The lack of information could impact on DOE's confidence in the reliability of the weapon.

Flight and Laboratory Tests Have Fallen Behind Schedule

DOE and the national nuclear laboratories[3] have determined that they generally need to test 44 weapons of each weapon type in the stockpile over a 4-year period.[4] Over that 4-year timeframe, the 44 tests per type of weapon should consist of 8 to 12 flight tests (an average of 2 or 3 tests per year) and 32 to 36 laboratory system tests of nonnuclear systems (an average of 8 or 9 tests per year). Finally, from the weapons scheduled for testing each year, one weapon of each type is designated for special laboratory tests of its nuclear components.

Flight Tests

Flight tests involve the actual dropping or launching of a weapon from which its nuclear components have been removed. DOE uses specially designed telemetry equipment to test the integration and functioning of the weapon's electrical and mechanical subsystems. As of February 29, 1996, three of the nine types of weapons that were scheduled to be tested were

[3]Sandia National Laboratories, Los Alamos National Laboratories, and Lawrence Livermore National Laboratories.

[4]The number of weapons needed to be tested can vary somewhat according to the history of the weapon type and the number of weapons of that type in the stockpile at that time.

more than 33 percent below the number of flight tests considered necessary to meet DOE's standard. These weapons are considered "red flagged." According to DOE officials, when a weapon is red-flagged, it means that DOE is concerned with the accuracy of the reliability level assigned to that weapon type and that management should focus attention on the need for obtaining test data. The following table shows the red-flagged weapons, the standard for testing, the red-flag threshold, and the number of tests conducted.

Table 1: Flight Testing of Three Weapon Types, Fiscal Years 1992 Through 1995

Weapon type	Standard (tests scheduled)	Red-flag test limit threshold	Actual tests completed
W62	12	<9	6
W78	12	<9	7
W88	12	<9	3

Source: Sandia National Laboratories.

The W62, a warhead used by the Air Force on the Minuteman III missile, has been flight tested only six times over the past 4 years. The W78, also used on the Minuteman III missile, is also below the red-flag limit. Only seven W78s have been flight tested during the past 4 years. The third weapon below the red-flag limit is the W88. The W88 is a warhead used by the Navy on the Trident II missile. Only three W88 stockpile flight tests have been conducted over the past 4 years.[5]

According to officials at DOE and the testing laboratory (Sandia National Laboratories) responsible for flight testing, several reasons exist for the shortfall in flight testing. Initially, DOE had enough packages of telemetry equipment to test the W62 during its projected lifespan. Retirement of the W62 has been delayed, however, and DOE is running out of telemetry packages and cannot procure additional packages unless they are redesigned. As a result, flight testing of the W62 has been reduced. In regard to the W78, DOE and national laboratory officials told us that flight tests with telemetry equipment were not conducted because available missile launches were used for other tests of the W78. Finally, flight testing of W88s taken from the stockpile was halted for more than 1 year because

[5]The desired number of flight tests for three other weapon types were not performed, but none of these had a shortfall that fell below the red-flag limit.

an important safety study required for disassembly and inspection of the W88 lacked approval.[6]

Although it plans to redesign the telemetry equipment for the W62, DOE estimates it will take at least 3 years to redesign and procure the package. Further, DOE and Sandia National Laboratories officials told us that future flight testing of the W62, as well as the W78, is uncertain because of possible restrictions on the number of missile launches that are made available to DOE by the Air Force. As a result, these two weapons could stay below the red-flag limit.[7] The safety study has been approved for W88s, and a DOE official told us that flight tests for this weapon type should reach desired levels sometime during fiscal year 1997. DOE and national laboratory officials are not concerned about the W88 because they have been able to collect considerable test data during the past few years by testing W88 systems that were never placed in the stockpile. Because the W88 is a relatively new weapon, DOE and national laboratory officials believe that the information from these "new material" tests provides good reliability data.

Systems Laboratory Tests

Systems laboratory tests involve testing the nonnuclear systems in a weapon to detect defects due to aging, manufacturing, or design. Only one of the nine weapon types is considered to be below the red-flag limit for systems laboratory tests. Three other weapon types did not have all scheduled systems laboratory tests performed, but were all above the red-flag limit.

The W88 is the red-flagged weapon type. It should have had about 28 laboratory tests conducted, but over the past 4 years, only 12 laboratory tests were performed. According to DOE and national laboratory officials, the tests were not conducted because of the aforementioned absence of a safety study and because a centrifuge used to simulate weapon motion was inoperative for about 1 year because of a cracked weld. Like the flight tests, DOE plans to be back on schedule in fiscal year 1997.

[6]The Nuclear Explosive Safety Study is required before DOE's Pantex Plant can disassemble and inspect a weapon selected for testing.

[7]DOE and national laboratory officials told us that the limitation on available missiles for weapons testing could also affect the W87 in the near future.

Nuclear Component Laboratory Tests Have Been Delayed

From the weapons scheduled for testing each year, one weapon of each type is selected to have its nuclear components package destructively tested. According to a DOE official, the five key components tested are the pit, the secondary, the detonator assembly, the high explosives, and the gas transfer system.[8] Generally, for each weapon type, one pit, one secondary, two to five detonator assemblies, the high explosives from one or two weapons, and one or two gas transfer systems are to be tested annually. Testing of four of these nuclear package components have been behind schedule in recent years. Only testing of high explosives has been conducted on schedule.

The pit is a part of the nuclear package that, until 1989, was manufactured and tested at DOE's Rocky Flats facility in Colorado. In December 1989, the Rocky Flats facility ceased production operations, and responsibility for pit testing was eventually transferred to DOE's Los Alamos National Laboratory. At first, it was thought that Rocky Flats would reopen, and several years passed until DOE decided to move pit tests to Los Alamos. This lapse created a backlog of pit tests. Los Alamos has nearly caught up and should be back on schedule by the end of this fiscal year.

The secondary is tested at DOE's Y12 facility in Oak Ridge, Tennessee. Few have been tested since September 1994 when Y12 was placed in a "stand down" mode because of problems related to safety procedures that had been noted by the Defense Nuclear Facilities Safety Board. According to DOE officials, most of these problems did not involve unsafe conditions. The problems were related to not following approved procedures for activities being conducted. DOE is in the process of testing seven secondaries (from four different weapon types) under special procedures but DOE officials could not provide us with a date for resuming full testing.

DOE's Mound facility in Ohio tested detonator assemblies until 1994. At that time, responsibility for testing detonator assemblies was moved to DOE's Los Alamos and Lawrence Livermore laboratories. Both laboratories are scheduled to begin testing detonator assemblies later this year. In the meantime, a 2-year backlog of detonator assemblies exists. DOE officials estimate that this backlog will be eliminated by the end of fiscal year 1997.

DOE's Mound facility in Ohio tested gas transfer systems until 1994. At that time, responsibility for testing gas transfer systems was moved to DOE's Savannah River facility in South Carolina. Savannah River has begun

[8]The pit is a metal casing that contains plutonium and other material. The pit is where the fission explosion originates. A nuclear weapon secondary is an assembly in a nuclear weapon where a fusion explosion originates. A gas transfer system includes a tritium reservoir and associated hardware.

testing some gas transfer systems, but a DOE official estimates that the backlog will not be eliminated until the end of fiscal year 1999.

In summary, Mr. Chairman, the preliminary results of our work indicate that portions of all three major components of DOE's stockpile surveillance program have been and are currently behind schedule. DOE is behind schedule for a variety of reasons and while some tests will soon be back on schedule, others will not be for the foreseeable future. These programs will become more important as weapons in the stockpile age beyond their originally planned lifespan. As we continue our work on this assignment, we will be analyzing the overall impact of this situation and DOE's corrective action plans.

Mr. Chairman, this concludes our prepared statement. We will be glad to respond to any questions you or any member of the Subcommittee may have.

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